

What is claimed is:

1. A method of forming a penetration electrode, comprising:
providing an electroconductive film on a first surface of a substrate in at least a portion of the substrate where the penetration electrode is being formed;
forming a protective member on at least said electroconductive film;
bonding said protective film to said substrate;
forming a micropore to penetrate through said substrate; and
after said electroductive film is provided, said protective member is formed and bonded, and said micropore is formed, inserting an electroconductive substance into said micropore, said electroconductive substance and said electroconductive film providing a conductive path through said substrate,
wherein said electroconductive film blocks off a first aperture of said micropore at said first surface of the substrate, and wherein said electroconductive substance is inserted into said micropore via a second aperture of said micropore at a second surface of the substrate opposite to said first surface.
2. The method of forming a penetration electrode according to claim 1, wherein the electroconductive substance is formed by a metal and is inserted into the micropore using a molten metal insertion method.
3. The method of forming a penetration electrode according to claim 1, wherein the electroconductive substance is formed by an electroconductive paste and is inserted into the micropore using a printing method.
4. The method of forming a penetration electrode according to claim 1, further comprising:
after said electroconductive substance is inserted into said micropore, removing said protective member from said electroconductive film and said substrate.
5. The method of forming a penetration electrode according to claim 4, wherein

said protective member is removed from said electroconductive film and said substrate by heating said substrate.

6. The method of forming a penetration electrode according to claim 1, wherein inserting said electroconductive substance into said micropore includes applying a first pressure to a side of said electroconductive film facing said first aperture of said micropore,

wherein said protective member holds said electroconductive film in place when said first pressure is applied to the side of the electroconductive film facing said first aperture of said micropore.

7. The method of forming a penetration electrode according to claim 6, wherein said first pressure is higher than a second pressure on a side of said electroconductive film facing said protective member.

8. The method of forming a penetration electrode according to claim 1, wherein said electroconductive substance fills said micropore.

9. The method of forming a penetration electrode according to claim 1, further comprising:

prior to inserting said electroconductive substance into said micropore, forming an insulating layer on sidewalls of said micropore.

10. The method of forming a penetration electrode according to claim 9, further comprising:

forming an insulating layer on said second surface of the substrate; and
prior to providing said electroconductive film on said first surface of the substrate and forming said micropore, forming an insulating layer on said first surface of the substrate,

wherein said micropore also penetrates through said insulating layer on said first surface, there being an opening through the insulating film on said first surface at said micropore,

wherein there is an opening through the insulating film on said second surface at

said micropore, and

wherein the insulating layer on the sidewalls of the micropore, the insulating layer on the first surface, and the insulating layer on the second surface are contiguous with each other.

11. The method of forming a penetration electrode according to claim 1, wherein the electroconductive film and the electroconductive substance are different materials.

12. A substrate with a penetration electrode, comprising:

a substrate;

an electroconductive film on a first surface of a substrate in at least a portion of the substrate having the penetration electrode;

a micropore penetrating through the substrate and filled with an electroconductive substance, one end of said micropore being blocked by said electroconductive film, wherein said electroconductive substance is in contact with said electroconductive film; and

a protective member on at least a portion of said electroconductive film blocking the end of said micropore, on a side of said electroconductive film opposite to said micropore, said protective member being bonded to said substrate.

13. The substrate with the penetration electrode according to claim 12, further comprising:

a first insulating layer lining sidewalls of said micropore; and

a second insulating layer on said first surface of the substrate, between said electroconductive film and said substrate, said micropore penetrating through the second insulating layer at the one end of said micropore being blocked by said electroconductive film, wherein contact between said electroconductive substance and said electroconductive film is not obstructed by said second insulating layer,

wherein said first insulating layer is contiguous with said second insulating layer.

14. The substrate with the penetration electrode according to claim 13, further comprising:

a third insulating layer on a second surface of said substrate, opposite to said first surface,

wherein there is an opening through said third insulating film at said electroconductive substance filling said micropore, and

wherein said third insulating layer is contiguous with said first insulating layer.